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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/445,808	02/29/2000	ARI HOTTINEN	PM-265154	1404

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EXAMINER	
LEE, TIMOTHY L	

ART UNIT	PAPER NUMBER
2697	8

DATE MAILED: 05/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/445,808	Applicant(s) HOTTINEN ET AL.
	Examiner Timothy Lee	Art Unit 2697

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-16 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-16 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 29 February 2000 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

3. Claim 3 is objected to because of the following informalities: there is no antecedent basis for "the parameter" or "the unknown signals". Appropriate correction is required.

4. Claims 6-10 are objected to because of the following informalities: there is no antecedent basic for "the parameter" or "the known signals". Appropriate correction is required.

5. Claims 5, 15, and 16 are objected to because of the following informalities: there is no antecedent basis for "the found signal". Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-13 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: Claims 1-13 do not include *any* functional steps.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 2, 11, 13, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Kawabe et al. (US 5,394,434).

10. Regarding claim 1, 2, and 14, Kawabe et al. discloses a demodulator for CDMA spread spectrum communications (a reception method in which the system CDMA is used). See Abstract. A receiving station receives a signal equal to the sum of the M signals transmitted by the transmitting stations (a received signal comprises a sum signal of signals originating from several transmitters). See col. 1, lines 10-23. An object of Kawabe et al. is to reduce co-channel interference in CDMA communications (interference elimination). See col. 1, lines 39-41. Referring to Fig. 1, the receiving station has an antenna 11 for receiving RF signals. The received baseband signal is input separately to each of the shift registers a chip at a time. Data from the shift registers are fed into a correlator 14 which correlates them with spreading codes generated by the spreading-code generator 15 (received sum signal is correlated by a particular spreading code, whereby a first symbol level signal is obtained). See col. 2, lines 24-33. Correlated data output from the correlator are supplied to an estimator, which generates and stores estimated symbol values (an estimate comprises one or more estimates of a received user signal; the computed estimate is correlated by the same spreading code, whereby a second symbol level signal is obtained). See col. 2, lines 33-36. A respreader obtains pairs of current and previous estimated symbol values and multiples their difference (that the second symbol level signal is subtracted from the first symbol level signal, whereby a residual signal is obtained). See col. 2, lines 36-41.

11. Regarding claim 11, the difference signal is found by the respreader, and the difference is calculated between two values that were symbol values to begin with, so the remainder must also be a symbol. Being that the difference signal is used in the interference subtractor, it exhibits properties of a noise signal, and a noise signal is not a coherent signal, so its symbols should be incoherent. See col. 2, lines 31-45.

12. Regarding claim 13, inherently, a difference between the two estimated signals gives a more refined estimate than was found with either of the first two estimates. See col. 1, lines 59-67. By comparing the two estimates that occur in multiple stages, you can see how the estimated difference has progressed.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 3, 4, 5, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawabe et al. in view of Divsalar et al. (US 5,644,592). The rejections of claims 1, 2, and 14 also stand in this rejection. Kawabe et al. does not expressly disclose estimating the parameters of the unknown signal from the residual signal. Divsalar et al. discloses summing the estimates of all the signals except for the one of interest, and subtracting this value from the baseband signal, thus yielding whatever signal is remaining. See col. 2, lines 45-64. It would have been obvious to a person of ordinary skill in the art at the time of the invention to find the parameters

of an unknown signal by subtracting all of the other signals away and coming up with a residual signal. One of ordinary skill in the art would have been motivated to do this because a good way of finding something that is unknown is to subtract away everything that is known from a composite signal.

15. Regarding claims 4 and 16, there is no other way that user signals can be found other than through "parameters", so this is inherent. The receiver must examine the distinguishing properties of the leftover signal in order to determine if it is noise or a new signal.

16. Regarding claim 5, in order to subtract every signal from a baseband signal, the receiver must have been performing simultaneous multi-user detection to pick up the various signals of which to sum and subtract.

17. Claims 6, 7, 8, 9, 10, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawabe et al. in view of Fukawa et al. (US 5,757,845). The rejections of claims 1, 2, and 14 also stand in this rejection. Kawabe et al. does not expressly disclose using a number of matched filters in which parameters of known signals are estimated. Fukawa et al. discloses the use of multiple matched filters that can detect the correlation between the spreading code of the desired signal and the sampled signal fed thereto. See col. 2, lines 12-38. The subtractor calculates an estimation error. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use matched filters in detecting multi-user signals in CDMA communications. One would have been motivated to do this because matched filters are commonly used in CDMA communications to receive and filter signals as disclosed in Fukawa et al.

18. Regarding claims 7 and 8, a signal is comprised of a phase and amplitude (and in CDMA, it also has a spreading code). In adding and subtracting the signals to get the estimation error, one must be adding amplitudes and phases in order find a resultant signal, so the signal parameters must include these factors. In addition, when performing the adding and subtracting, the resultant signal could be yielded at the same time, so the parameters are all estimated in parallel.

19. Regarding claim 9, Fukawa et al. does not expressly disclose finding the parameters of the error signal in sequence, but it would have been obvious to do this by performing the same operation a few times in a row and only extracting the desired parameter each time.

20. Regarding claim 10, Fukawa et al. does not expressly disclose using parameters that have already been found in the combined signal to find further unknown parameters of a signal, but it would have been obvious to use what was already known in the combined signal so that the estimation error could be more accurate. See col. 2, lines 12-39.

21. Regarding claim 12, Kawabe et al. does not expressly disclose that the residual signal comprises user symbols that are coherently combined. Fukawa et al. discloses performing the summing and subtraction of signals when the signals are in-phase with each other. Therefore, it would have been obvious to have symbols that are combined coherently when they are in-phase with each other. One would have been motivated to do this because having the signals synchronized makes for having simpler receiver equipment.

Conclusion

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Baier et al. (US 5,970,060), Theilecke et al. (US 5,719,899), Dent (US 5,218,619),

and Fukasawa et al. (US 5,463,660) disclose systems that subtracting one signal from another to obtain some new signal or information.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy Lee whose telephone number is (703)305-7349. The examiner can normally be reached on M-F, 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (703)305-4789. The fax phone numbers for the organization where this application or proceeding is assigned are (703)746-9420 for regular communications and (703)746-9420 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-4700.

TLL
May 6, 2003

RICKY NGO
PRIMARY EXAMINER